An Overview of the Hearing Loss Prevention Program at NIOSH

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May 5, 2005

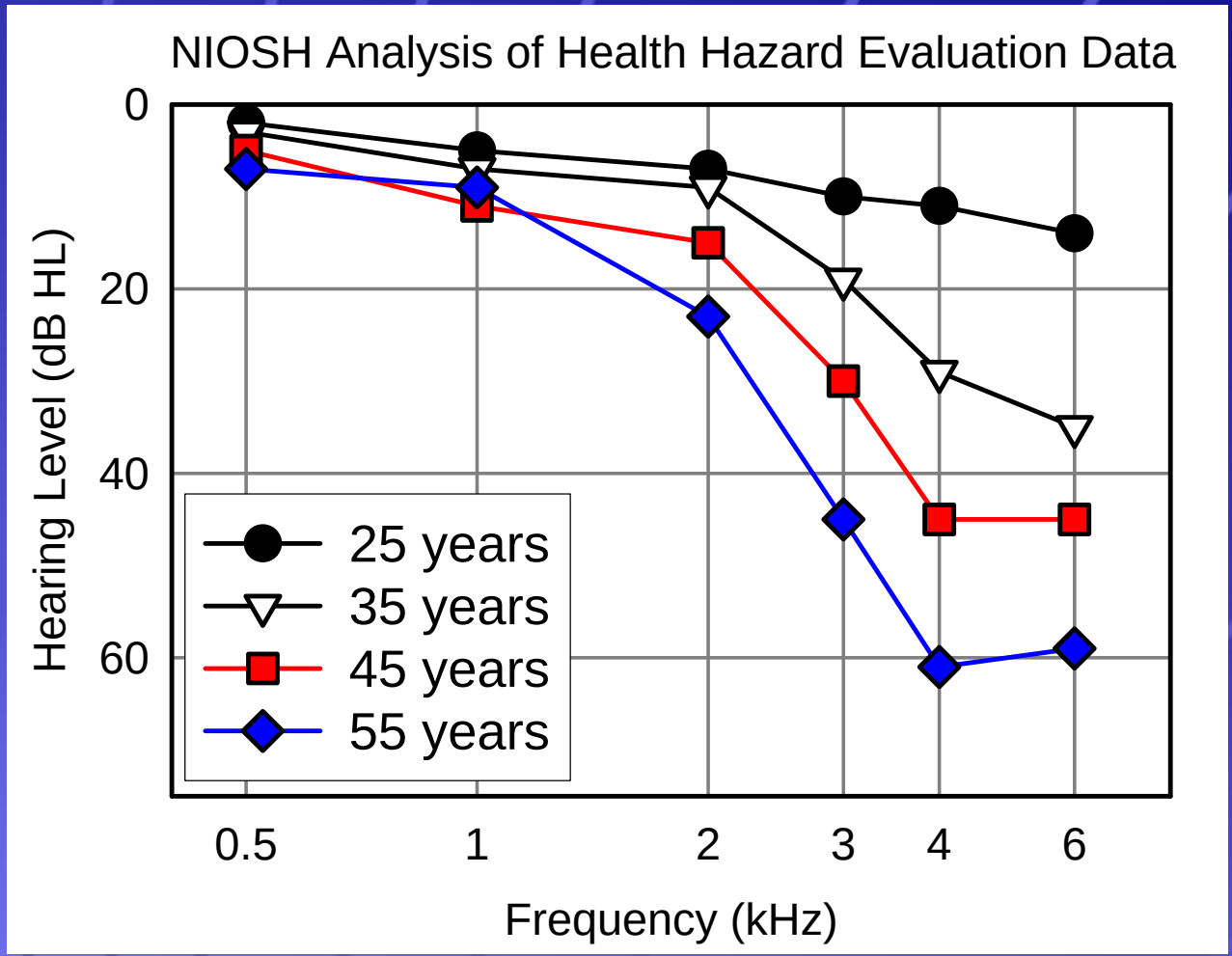
Presentation Outline

- Define the problem
- Inputs for the NIOSH HLP Program
- Research Program Development
- Research Activities
- Program Outputs
- Partnerships and R2P

The Occupational Hearing Loss Problem

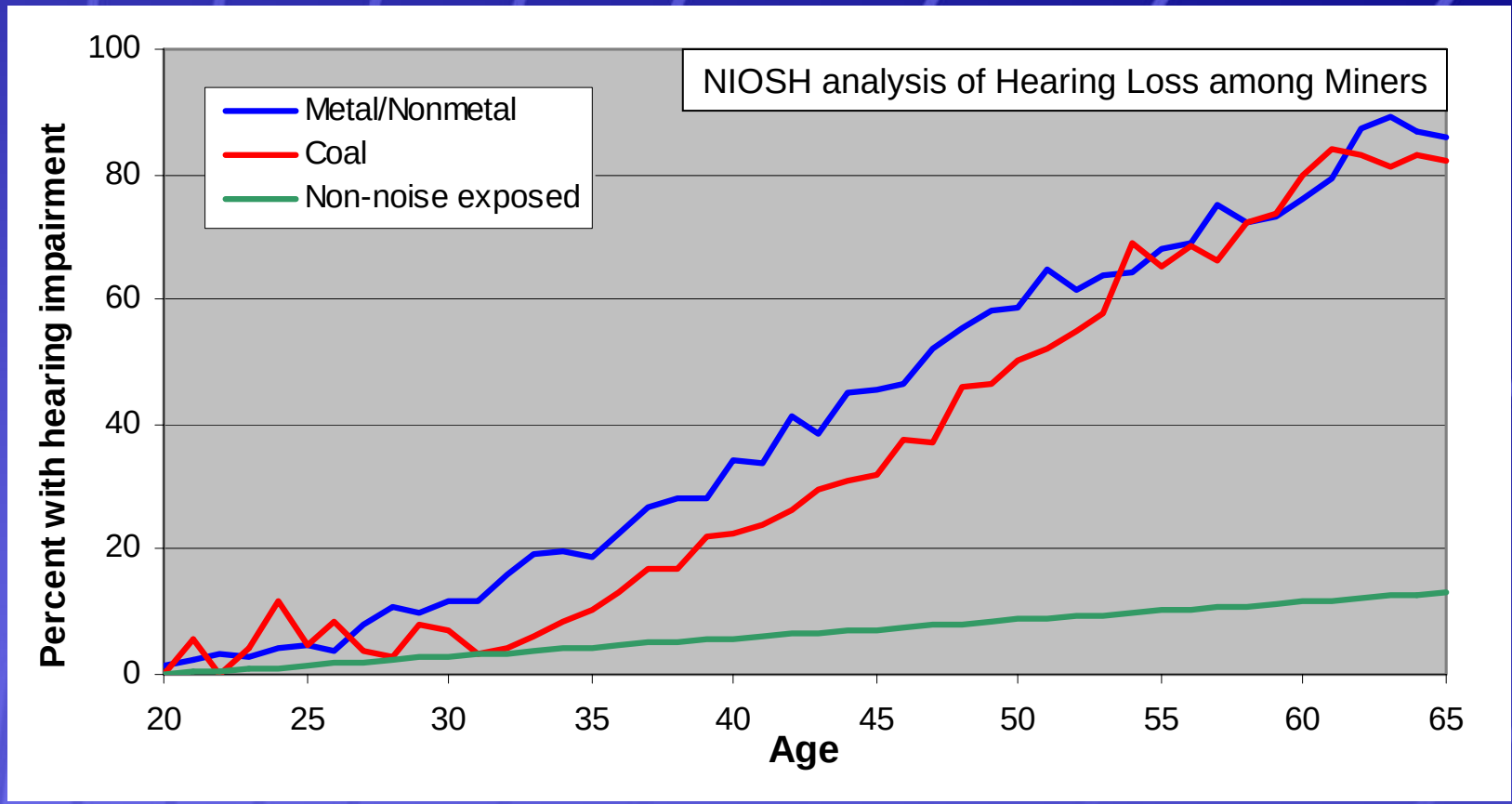
- 30 Million workers in U.S. at risk
- Cross-cutting issue, affects workers in nearly every sector
- Currently no recovery; severely impairs quality of life
- One of most common workplace illnesses/injuries

Hearing Loss in Carpenters with Age



Males with Hearing Impairment *

Coal Miners, Metal/Nonmetal Miners, and Non-noise Exposed



* > 25 decibel hearing loss (averaged over 4 frequencies in each ear)

Landmarks in NIOSH HLP Program

- 1973: Criteria Document
- 1984: Compendium of Hearing Protector Devices
- 1990: Preventing Occupational Hearing Loss: A Practical Guide
- 1996: Pittsburgh Research Lab joined NIOSH
- 1998: Revised Criteria Document
- 2000: NORA Intramural Noise Research Program Proposed

HLP Challenges – NIOSH approach

- *Surveillance* – understanding HL in today's workforce and providing better data for risk assessment
- *Intervention* – developing solutions to prevent injury from known hazards to hearing
- *Hazard characterization* – filling knowledge gaps for hazards that are not well understood

Inputs

NIOSH HLP Program involves Multiple Divisions/Labs

- Division of Applied Research and Technology (DART)
- Division of Surveillance, Field Studies and Hazard Evaluation (DSHEFS)
- Education and Information Division (EID)
- Pittsburgh Research Laboratory (PRL)

Reverberation Chamber - PRL

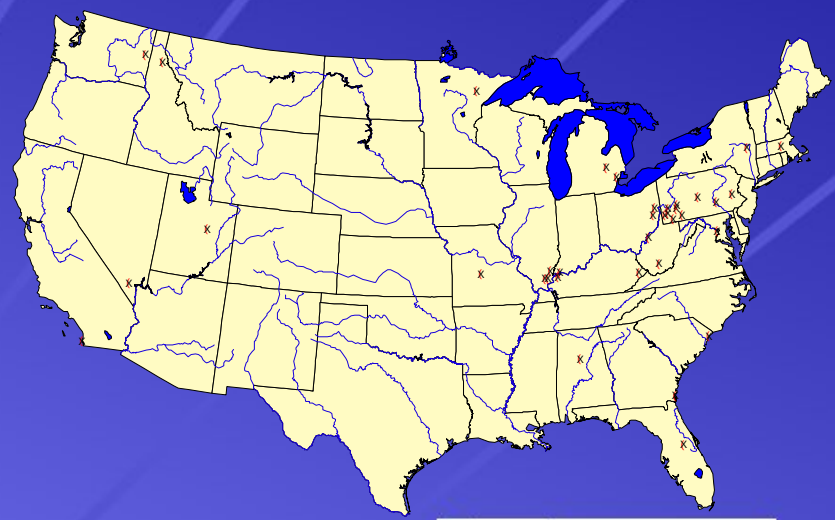
- Sound Power Measurements
- Large Equipment Capability
- Precision-Grade Measurements
- Engineering Control of Noise

Audiometric Facilities

- Hearing Protector Laboratory
- Audiometric Suites
- Semi-anechoic Chamber

Mobile Audiometric Research Facility

- Hearing Screening
- Hearing Protector Fit-Testing
- 42 sites nationwide



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WORKPLACE SAFETY AND HEALTH

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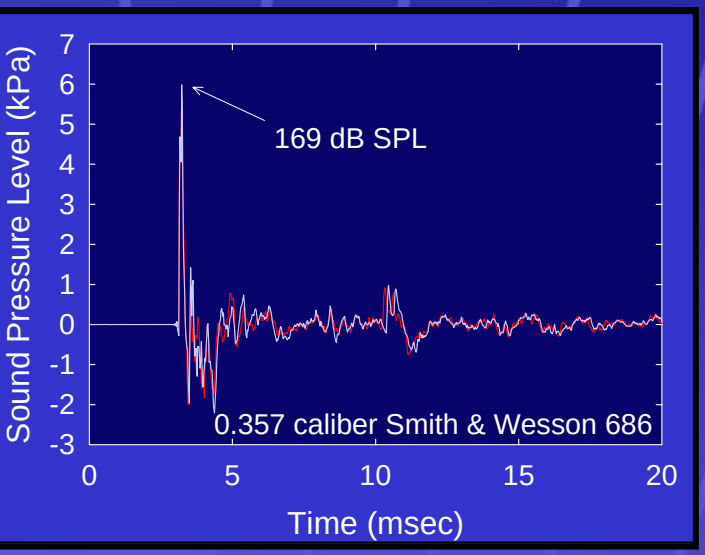
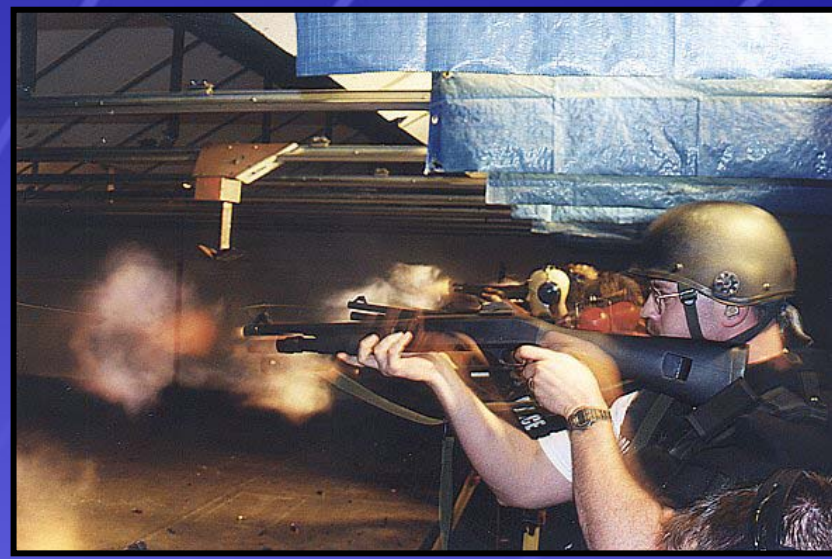
Field Study Capabilities



- Noise Level Assessments
- Hearing Protector Research
- Impulsive Noise Recording/Analysis
- Audiometric Database Analysis



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NIOSH HLP Program Resources

- Intramural Research FY05 funding = $ 5.2 M
- Extramural Research FY05 funding = $1.3 M
- Staffing FY05: approximately 40 FTE
- Interdisciplinary: 15 engineers, 6 audiologists, 4 psychologists, 9 other disciplines
- Two teams (Cincinnati and PRL) have strengths that are strongly complimentary

Planning Inputs

- Surveillance data, internally and externally derived
- Stakeholder input – workshops, NORA teams, partnership activities
- Risk assessment – Criteria Document, consensus committees
- Scientific knowledge gap assessment

Program Development

Establishing Program Goals

Criteria Document 1998

- Noise Control
- Impulsive Noise
- Exposure Monitoring
- Hearing Protectors
- Training and Motivation
- Ototoxic Chemicals
- Program Evaluation
- Rehabilitation

NORA Planning 2000

- Coordinated NIOSH efforts
- Planning meeting in early 2000
- Program Proposal submitted and funded in FY2001
- 5-year effort

HLP Research Program
Developing the Project Portfolio

- Investigator initiated proposals
- Management review of relevance, quality, potential impact and technology transfer (R2P)
- External review of proposals and protocols
- Annual review of progress (internally)

Research Activities

HLP Research Program
Major Intramural Emphasis Areas

- Noise Control
- Hearing Protectors
- Exposure Monitoring
- Training/motivation/worker empowerment

HLP Research Program
Major Intramural Emphasis Areas

- Impulsive Noise
- Auditory Effects of Chemicals
- Program Evaluation
- Rehabilitation of Hearing Impaired Workers

Major Changes in HLP Program 1996-2005

- Growth in mining and construction research
- Increased collaboration/interaction among NIOSH division and labs
- Increased utilization of partnerships
- Increased emphasis on engineering controls
- Discontinuation of laboratory animal research
- Information dissemination through internet

NIOSH Hearing Loss Prevention Extramural Research Funding

Recent Projects include:

- Hearing damage in construction workers
- Noise, solvents and hearing loss
- Hearing conservation program for rural areas
- Engineering control of longwall machine noises
- Model HC program for coal miners
- Models for assessing risk of occupational HL

Outputs

NIOSH HLP Program Outputs

Different types of products

- Scientific Research Reports
  - Journal articles, Technical reports, Presentations, Proceedings
- Recommendations
  - Criteria documents, Best-Practices workshop proceedings, HHE reports, NIOSH Alerts
- Information Dissemination
  - Web-based information, Pamphlets, Videos, Partner briefings

NIOSH HLP Program Outputs

Balancing the Focus on Product Development

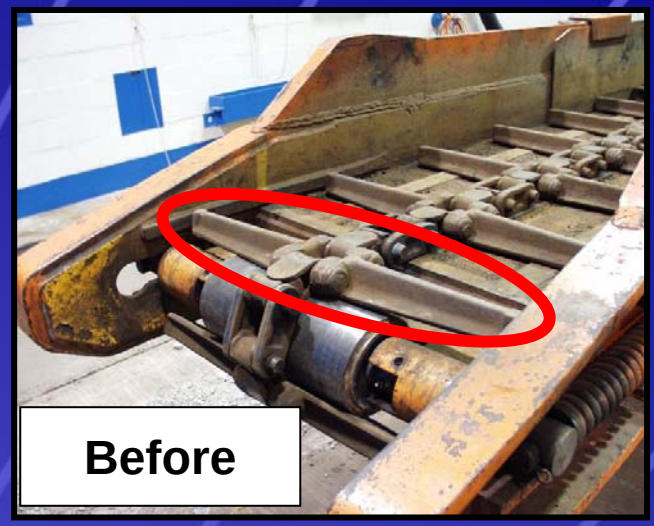
- Scientific publications are essential to
  - advancing scientific knowledge
  - maintaining professional credibility
  - providing supporting evidence for recommendations
- Worker-friendly products are essential to
  - meet stakeholder needs
  - translate technical material into information workers and employers can use
  - transfer knowledge to those who can implement it

Examples of Significant* Outputs

*Those products with developing or potential impact

Engineering Noise Controls

- Plastic-coated conveyer flight bars and composite tail roller
- Lab and field evaluations
- NIOSH, Joy Mfg., Consol mining, and CUE partnership effort
- Result, 9 dB Noise Reduction
  - flight bars: 7 dBA reduction
  - tail roller: 2 dBA reduction
  - now sold by Joy Mfg.



Hearing Protector Evaluation and Testing

- Contributed to science that demonstrated the actual real world effectiveness of HPDs
- Partnered with other researchers in developing improved testing methods
- Results:
  - basis of revised NIOSH policy on derating HPDs
  - led to change in ANSI standard on testing/rating
  - led to ISO adoption of new standard
  - stimulated EPA to reopen discussion of existing regulation

Hearing Loss Simulator

- Windows-based software
- Workers can hear the effect of hearing loss
- Benefits:
  - Positive changes in beliefs
  - Greater motivation to conserve hearing
- Hundreds of requests, including key officials in MSHA, NHCA, CAOHC

Ford Plant HL Prevention Program

- Stable manufacturing processes and noise exposures prior to 1988-1990 evaluation of program
- Audiometric records available include pre-employment
- Data analysis revealed hearing loss documentation but not prevention
- Ford implemented NIOSH (1990) Practical Guide
- Results:
  - worker monitoring, audiogram surveillance, HPD utilization all improved
  - partial results suggest threshold shift rates dropped

Partnerships and Research to Practice

Partnerships open doors to work sites, equipment, interaction with workers and employers, and stakeholder investment.

Surveillance

- United Brotherhood of Carpenters development of survey tools and program evaluation
- GM, UAW and James Anderson Associates study of advanced hearing protector technologies
- Bertrand Johnson Acoustics, Ford, Con-Agra evaluation of impulsive noise effects on workers

Intervention

- UMWA, BCOA, NMA & MSHA development of effective noise control technologies for mining
- EPA ANSI development of revised standards and regulations for hearing protection devices
- Howard Leight / Bacou-Dalloz development and fielding of advanced hearing protector test software.

Hazard Characterization

- NIWL, PAHO, ICOH, Nordic Expert Group development of guidelines for mixed exposures (organic solvents and noise)
- Larson-Davis CRADA development of sound level meter for impulsive noise
- University of Cincinnati genetic susceptibility for hearing loss with noise and aging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